General Notes.

GEOLOGY AND PALEONTOLOGY.

Faunal Migrations.—An interesting account of the changes in the Mesozoic faunal geography of California is given by James Perrin Smith in a recent number of the Journal of Geology (May and June, 1895). These changes the author attributes to migration and points out that marine currents along continental borders are favorable to migrations. His conclusions, given below, are based on a study of the faunal relations of the various series of sedimentary rocks of California, and the faunal relations which California had with various regions during different periods of geologic history.

From the data in hand, Mr. Smith concludes that at the beginning of the Upper Devonian, some widespread disturbance occurred, opening up connection between the American and Eurasian Seas.

The lower Carboniferous fauna of California was developed directly out of Devonian fauna predecessors with the addition of some Eurasian elements by migration.

The Upper Carboniferous fauna was developed directly out of that of the Lower Carboniferous, but still with intermigration with the Russian and Asiatic regions, so that the California Carboniferous resembles the Eurasian even more than it does that of the eastern United States.

The lower Triassic fauna of the West is entirely foreign, having migrated in from unknown regions, but having reached nearly simultaneously the western part of America, the Salt Range in India, and northern Siberia, but having been cut off from central Europe.

The Middle Trias of the West already begins to show relationships to the Mediterranean province of Europe, showing a connection in that direction, while the similarity to the faunas of the Arctic Trias province is disappearing.

In the Upper Trias the nearest faunal affinities are with the Himalayan and the Mediterranean provinces.

In the Lower and Middle Jura there was no connection with European waters through the Pacific region, but rather through the Atlantic or "Central Mediterranean Sea" of Neumayr, bringing a central European fauna.

Near the beginning of the Upper Jura this connection with European waters was cut off, and one established with those of Siberia and northern Europe, bringing in a Boreal fauna.

This same connection was continued through part of the Lower Cretaceous, giving a boreal fauna to the Knoxville.

Near the beginning of the Gault, connection with the Boreal sea of Russia was cut off, and communication established with southern India and through that country with central and southern Europe, bringing in a warm-water fauna. This connection existed during the greater part of the Cretaceous, but after this time the faunas are confined much more closely to their present ranges, although even to-day many of our living and Tertiary mollusca are found in Japan.

These changes in faunal geography are too widespread and easily correlated over great areas to be charged to mere mountain-making; they must rather be of the nature of continental uplift and subsidence. A study of these changes will throw light on the problem of the extinction of faunas and explain the great poverty of certain beds, in which the conditions for life seem favorable.

The fauna of California has not been a genetic series, but rather a succession of independent faunas, derived by migration from various parts of the earth, complicated by the mixture with the products of local development. Therefore, the student that would intelligently study the genesis and history of this fauna, must not neglect the fossil records of any region, since all may have contributed some elements to this complex assemblage of forms.

A new Geomyid from the Upper Eocene.—A rodent from the Uinta beds (Upper Eocene) of Utah, representing a new genus, is described by Prof. W. B. Scott in the Proceeds. Phila. Acad. 1895, p. 269 under the name *Protoptychus hatcherii*. The skull only is known, including the dentition of the upper jaw, but this proves to be of unusual interest and brings to light some unexpected facts which are thus summarized by the author:

(1). Protoptychus, a new rodent from the Uinta Eocene, is an unexpectedly modernized form, which has already acquired very large mastoid bullae, a rostrum, incisive foramina and posterior nares greatly resembling those of the jumping-mice, and, as in that family, the articulation of the jugal with the lachrymal is retained. The infraorbital foramen is of the murine type. The dentition and the shape and construction of the mastoid and surrounding parts of the cranium most resemble those of the Heteromyidae.

(2). The genus is probably to be regarded as the ancestral type of the Dipodidæ and indicates an American origin for this family, being much more ancient than any known representative of the group in the Old World, which it appears to have reached by a comparatively late migration. Paciculus of the John Day beds is a somewhat aberrant number of the same line.

(3). It is not improbable that the Heteromyidæ were derived from some form related to Protoptychus, though not from that genus itself.

(4). The Geomyidæ are descended from early forms which may best be referred to the Heteromyidæ and in which the tympanics and the mastoids were already greatly inflated. The assumption of subterranean habits of life brought about a reduction in this region of the skull and led to the acquisition of the many peculiarities which characterize the recent pocket-gophers. Pleurolicus and Entoptychus represent stages in this change and are more or less directly ancestral to the modern Geomyidæ. (Proceeds. Phila. Acad., 1895.)

Cenozoic History of the Baltic Sea.—In a preliminary report on the Physical Geography of the Litorina Sea[1] Mr. H. Munthe gives a summary of the present saltness of the Baltic and a report of the present distribution of the Mollusca that concern the Litorina-sea especially; he then discusses the question of the distribution of the Mollusca during the saltest part of the Litorina-time. The report includes also the author's investigations of the diatomaceous flora of the Litorina-sea and its rhizopod- and ostracod-faunas (on which subject but little has been hitherto published) and in this connection he gives briefly the testimony of diatoms in the hydrography of the Litorina-sea.

From the facts presented in the communication the late Cenozoic history of the Baltic can be summed up in the following manner:

A. Younger Glacial Epoch.

(1). *Time of the younger Baltic glacier.*

(2). *Late Glacial time.* The land-subsidence in Scandinavia now reaches its maximum during the Cenozoic period. The Baltic has the character of an ice-sea with *Yoldia arctica* Gray, etc., and is in open connection with the Cattegat across the northern part of South Sweden (Lakes Wettern, Wenern, etc.) and possibly also with the White sea across the Ladoga, etc.

[1] The author defines Litorina-time as that relatively salt phase of the Baltic Sea's postglacial history, which was subsequent to the Ancylus time during which the Baltic was shut off from the ocean and had the character of a fresh-water inland lake.

(1). *Ancylus-time.* Owing to upheaval of land in the South Baltic region and gradually also in adjacent parts towards the north, the Baltic ice-sea got the character of a fresh-water lake. Climate temperate. A transgression of the Ancylus-lake takes place at a later phase—due to upheaval of land in the central and subsidence in the southern portions of the Baltic district. At that phase the lake had its outlet within the Danish archipelago.

(2). *Litorina-time.* In consequence the Baltic by degrees came into open connection with the Cattegat through the Belts and the Sound and finally reached the salter and warmer character shown in the paper. Owing to a later upheaval of land—that has been greater the further one goes towards the central parts of Scandinavia—the saltness decreased more and more and in consequence the more stenohalinic forms retired towards the South Baltic district, and *Limnœas*, etc. immigrated; the Baltic thus entering into the

(3). *Limnœa-time.* This time seems to come, however, so near the present or *Mya-time* that I hesitate whether it is suitable to maintain the *Limnœa-time* as a particular one. (Bull. Geol. Inst. Univ. Upsala Vol. II, 1894).

Fossil Elephants of Tilloux.—M. Marcellin Boule calls attention to the discovery recently made in the "ballastiere" of Tilloux near the station of Gensac-la-Pallue, of the remains of gigantic elephants, associated with implements of human industry. The most noteworthy among these fossils are two tusks of *Elephas meridionalis*, whose size surpasses all the tusks belonging to the Museum of the Acad. Sci. Paris. But slightly bent, their line of curvature measures 2 m., 85, while that of the Durfort elephant in the Museum measures 1 m., 70, and the modern elephant in the gallery of Zoologie 1 m., 87. M. Boule announces also, finding in the same deposit two molar teeth belonging to the same individual, and the remains of other Proboscidians, such as *Elephas antiquus* and *E. primigenius*, also the molar teeth of Rhinoceros, Hippopotamus, *Cervus e laphus* a Bos, probably the *Bison priscus* figured in the collections of M. Chauvet. We have here then, says M. Boule "a deposit similar to those of certain localities in the north of France, characterized by *Elephas antiquus*, but in which there is found a lingerer (*E. meridionalis*) and a fore-runner (the Mammoth); another proof of the continuity of geological and paleontological phenomena."

As to the flint fragments found in the same beds with the animals above mentioned, they are often very fine and reproduce the diverse

forms of Chelles and of Saint-Acheul. M. Boule states that in addition to the usual almond forms, there are discs, scrapers, small carefully made, and even plates skillfully cut, things one would hardly except to find in a deposit of this sort. It is the first time, adds the author, that indisputable objects of human industry have been found contemporary with an elephant of which the species has, heretofore, been characteristic of the Pliocene age. (Revue Scientifique, Août, 1895).

The Latest Connection between the Atlantic and Pacific Oceans.—Before the Geological Section of the American Association for the Advancement of Sciences assembled in Springfield, Dr. J. W. Spencer presented a short abstract of some investigations of no small interest to biologists, under the title of "Geological Canals between the Atlantic and Pacific Oceans." In extending his researches on the great changes of level of land and sea and the evolution of the present continental reliefs, the author carried his explorations to the Tehuantepec Isthmus. In that region he found that late in the Pleistocene period there were shallow straits connecting the Atlantic and Pacific Oceans, in a region now elevated about 1000 feet above sea level. The deeper parts of these straits evidently formed canals, now elevated 800 feet. These discoveries show for the first time the very late Pleistocene connection between the two oceans, and the occurrence of shallow waters which have permitted considerable intermingling of littoral fishes and invertebrates, while excluding from the Gulf of Mexico all deep sea fishes, and thus explaining in part the distribution of modern marine life in the waters adjacent to Central America.

BOTANY.

Notes on Recent Botanical Publications.—In the Contributions from the Gray Herbarium of Harvard University (New Series, No. IX), B. L. Robinson and J. M. Greenman publish papers on (1) The flora of the Galapagos Islands, as shown by the collections of Dr. G. Baur; (2) New and noteworthy plants chiefly from Oaxaca, collected by Messrs. C. G. Pringle, L. C. Smith and E. W. Nelson; (3) A synoptic revision of the genus Lamourouxia; (4) Miscellaneous New Species.—The List of plants obtained on the Peary Auxiliary Expedi-